



**National
Transportation
Safety Board**

The NTSB Mission: Enhancing Transportation Safety

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Board Member**

**ECRI Institute
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Federal Agencies: Transportation

NTSB

FMCSA

FRA

NHTSA

PHMSA

DOT

MARAD

FTA

FHWA

FAA



NTSB



- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



NTSB



All Modes



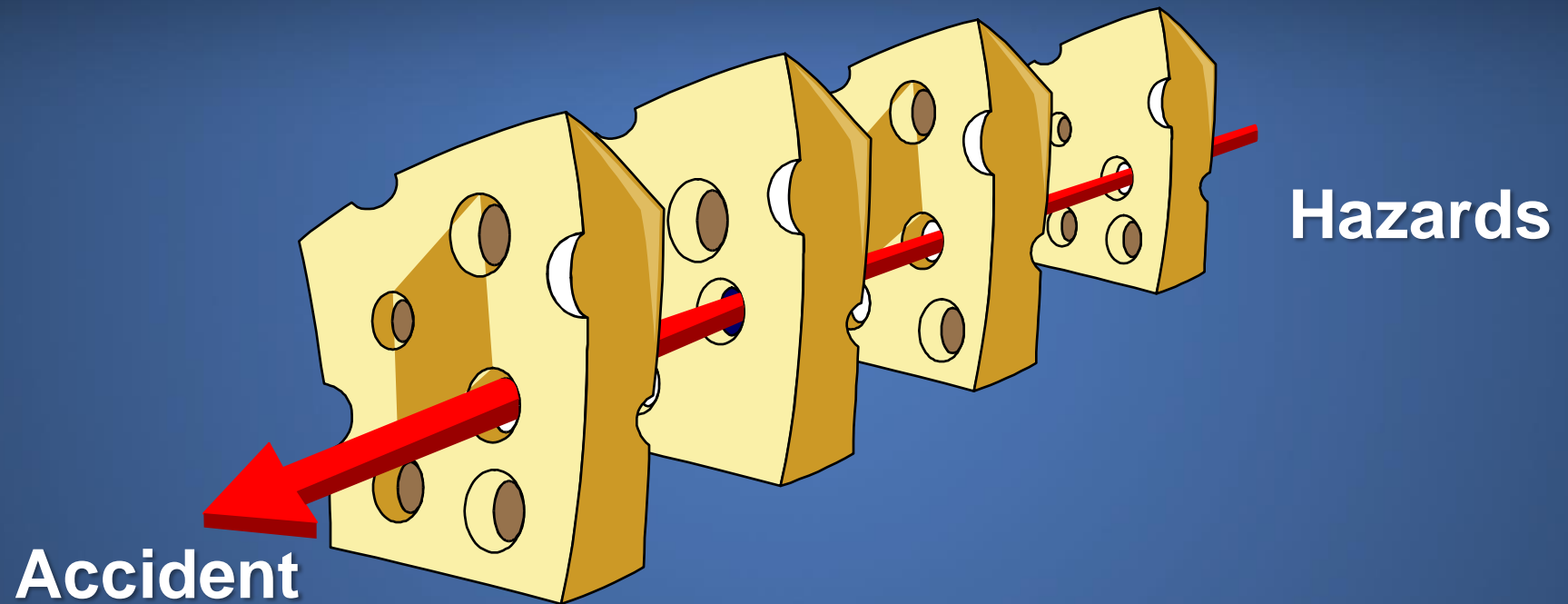
NTSB

Independent Federal Agency: Created in 1967

- >140,500 accident investigations
- 14,000+ safety recommendations
- ~ 2,300 organizations/recipients
- 82% acceptance rate



“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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NTSB Go Team: 24/7/365

- Individual investigator
- Regional/limited team
- Major launch/Board Member



Key On-scene Events



Organizational Meeting

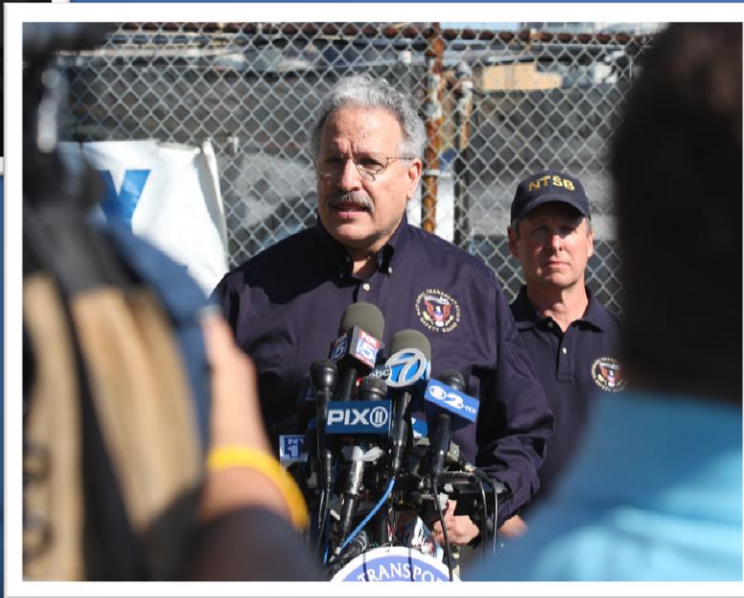
- Designate parties and party coordinators
- Establish and organize groups

Progress Meetings

- Summarize findings
- Info for briefings

Family Briefings

Press Briefings



NTSB

NTSB Investigative Process



On-scene Investigation

Organizational Meeting Groups and Parties

Progress meetings
Media Briefings
Press Releases

		NTRM ID: 004068687 Case Number: 00-03339 Case Name: Texas Association		No. Investigator ID#	
AIR					
Airline		Date 01/14/2010	City Code MEXC	Last Name 2007	Time Zone EDT
Flight Information					
Passenger Name NGDBS	Aircraft Identification 806M60497 INC	Departure Date 01/14/2010		Flight Number DCA-442	
Time of flight					
Time of departure 06:00	Time of arrival 07:00	Departure 06:00	Arrival 07:00	Time of departure 06:00	Time of arrival 07:00
Airline Transport Pilot Log					
Signature					

Preliminary Report

Factual information



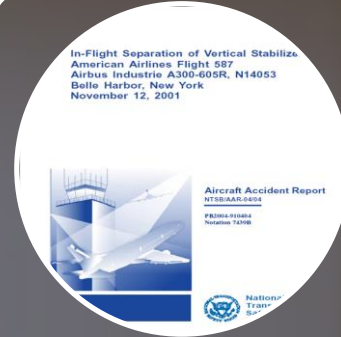
Public Hearing

Fact finding
Depositions
Witnesses
Docket



Board Meeting

Docket
Findings
Conclusions
Probable Cause
Safety
Recommendations



Final Report

Government in the Sunshine Act

Descent Below Visual Glidepath and Impact With Seawall
Asiana Airlines Flight 214
Boeing 777-200ER, HL7742
San Francisco, California
July 6, 2013



Accident Report

NTSB/AAR-14/01
PB2014-105984



**National
Transportation
Safety Board**

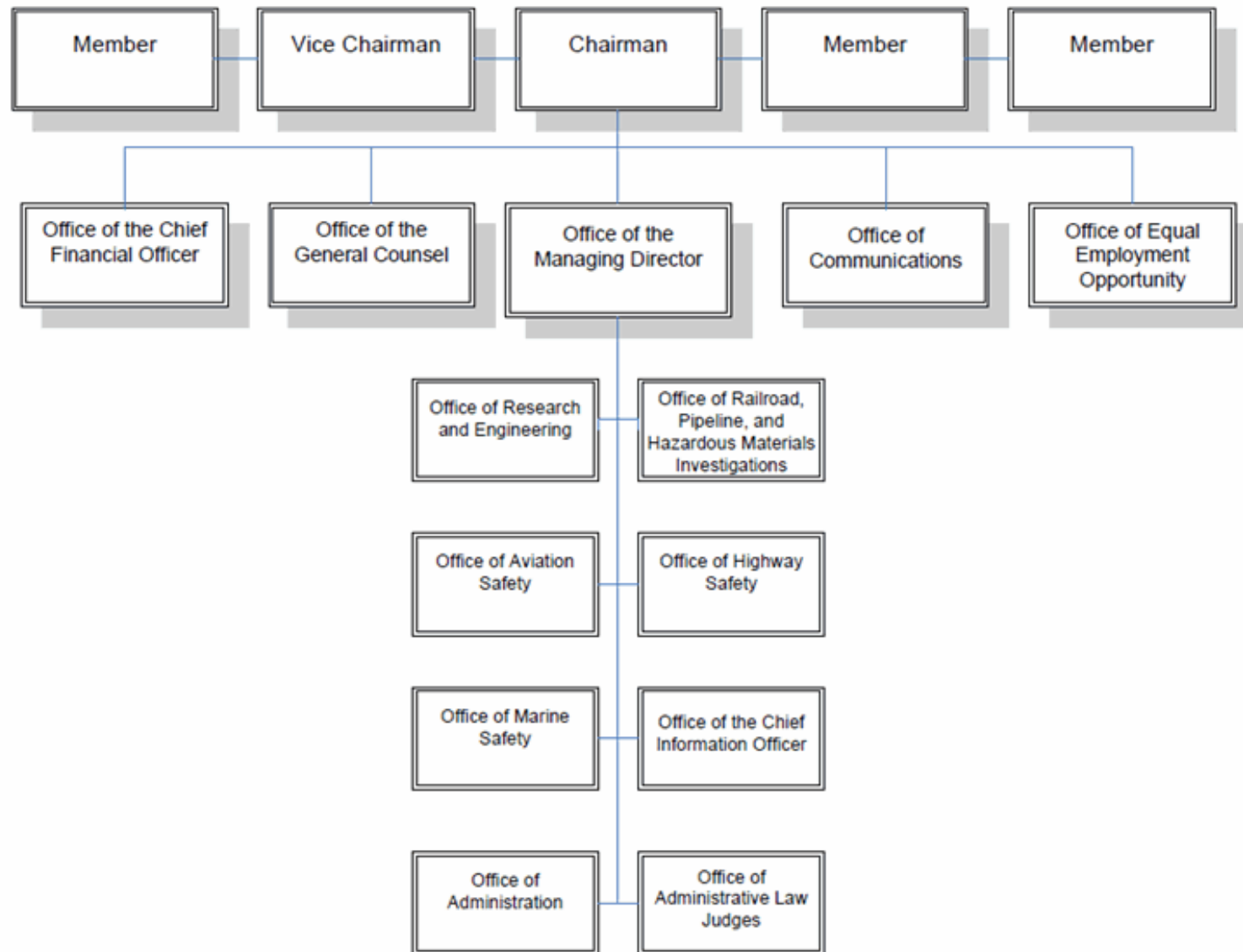
Final Accident Report

- Factual Information
- Analysis
- Conclusions
 - Findings
 - Probable Cause
- Recommendations



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NATIONAL TRANSPORTATION SAFETY BOARD



NTSB: The Board

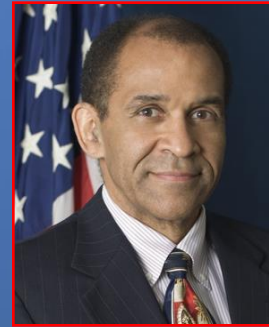
- Five Members:
 - President nominates
 - Senate confirms



Earl Weener
Member



Robert Sumwalt
Member



Chris Hart
Acting Chairman



Mark Rosekind
Member



Honorable John K. Lauber:

No Accident \neq
Safe Operation



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Challenges of a 24/7 Society



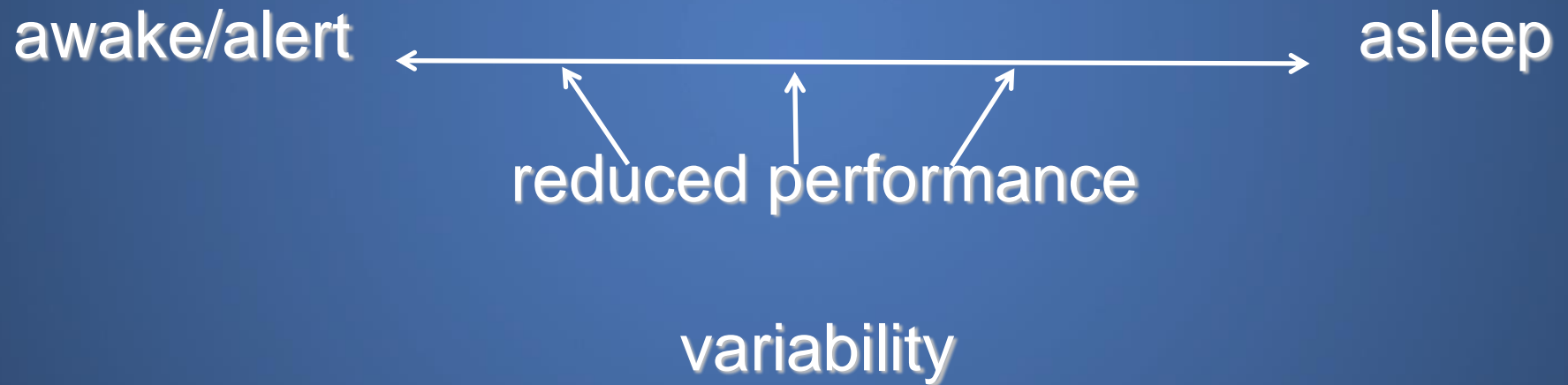
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Four Fatigue Factors +

- Sleep loss
- Continuous hours of wakefulness
- Circadian/time of day
- Sleep disorders
- Other considerations



Fatigue Risks



Fatigue Risks

- degraded 20 – 50%+:

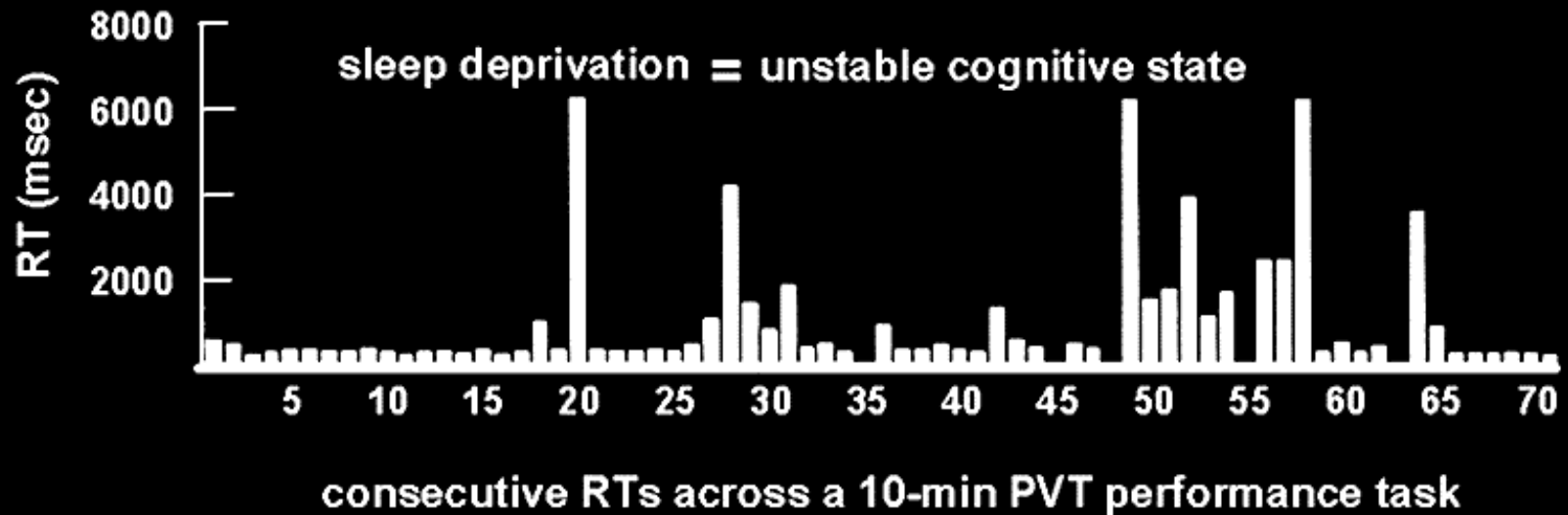
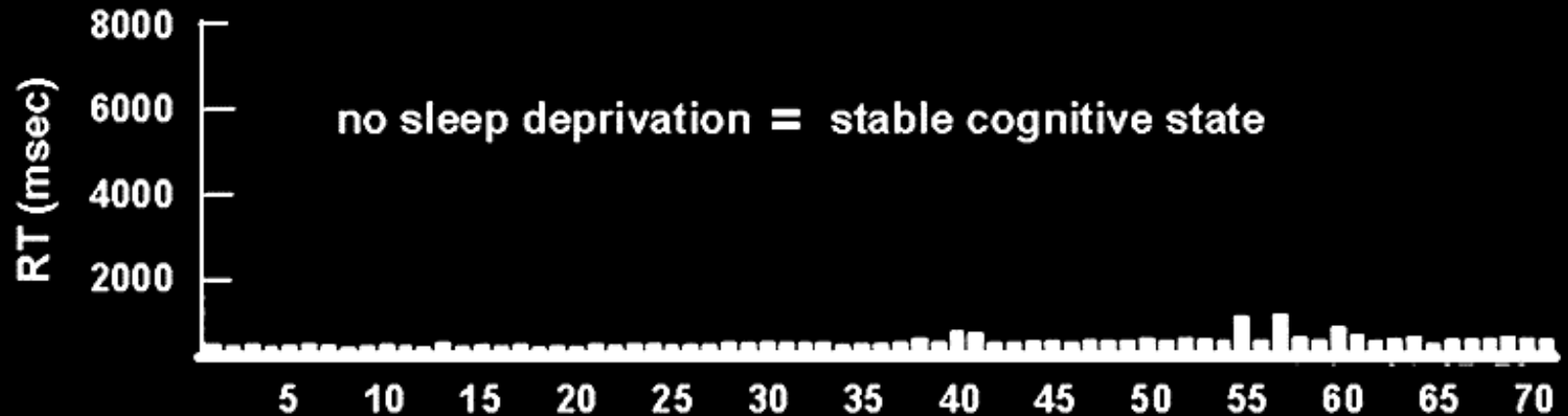
- reaction time
- memory
- communication
- situational awareness
- judgment
- attention
- mood

- increased:

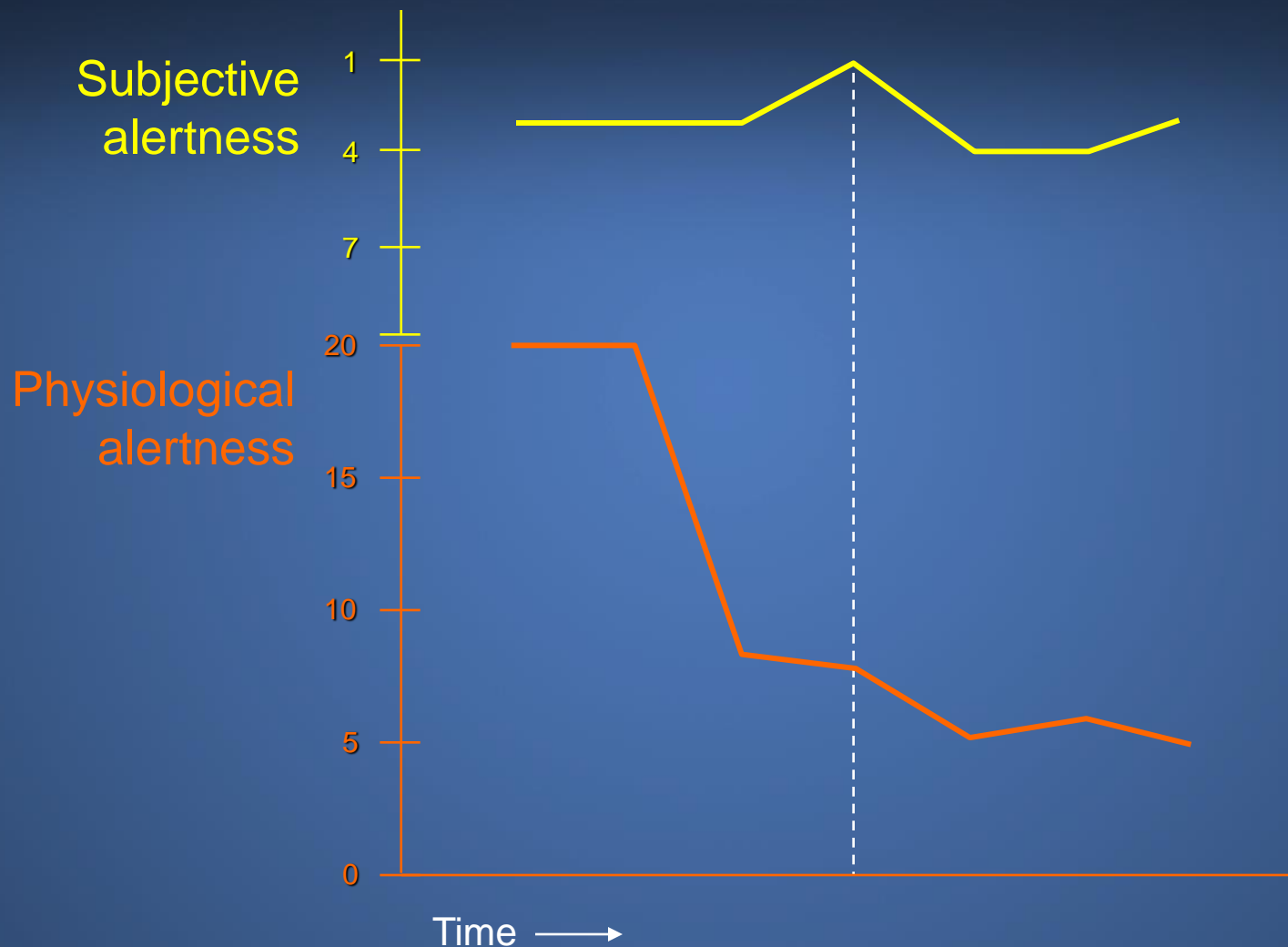
- irritability
- apathy
- attentional lapses
- microsleeps



Fatigue and Reaction Times



Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



NTSB

Uncontrolled In-Flight Collision with Terrain AIA Flight 808, Douglas DC-8-61, N814CK U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

First NTSB aviation accident investigation
to cite fatigue as probable cause

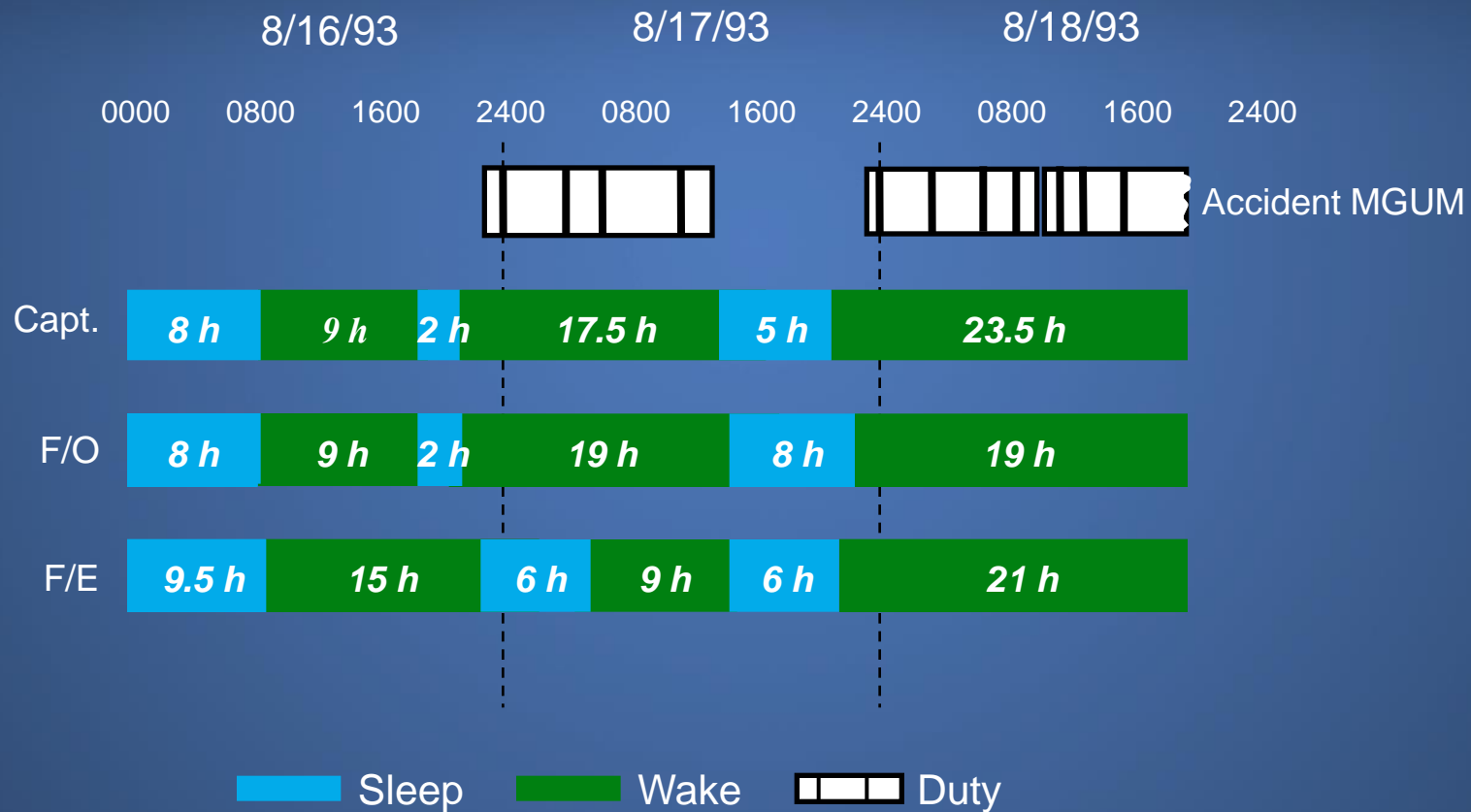


- acute sleep loss, sleep debt, circadian disruption



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Crew Sleep History



Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time





NTSB

Uncontrolled In-Flight Collision with Terrain
AIA Flight 808, Douglas DC-8-61, N814CK
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue...”



NTSB

Miami, Oklahoma (June 26, 2009)

Fatigue Factors

- Off work for 3 weeks: day active/night sleep schedule
- 3am to 3pm shift work/drive schedule (since 1997)
- Early bedtime (2 hr phase advance in sleep time)
- Obtained min 3 hrs/max 5 hrs sleep prior to accident
- Subsequently diagnosed with mild sleep apnea



10 fatalities
3 serious injuries
2 minor injuries
5 no injuries

**Ford
Windstar**



**Hyundai
Sonata**

**Kia
Spectra**

Source: Oklahoma State Police

Probable Cause (fatigue)

“ . . . driver’s fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver’s failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . . ”





National Transportation Safety Board

Animation of Accident Reconstruction

Motorcoach Run Off Road-Collision with Bridge Signpost

Interstate Highway 95 Southbound

New York, New York

March 12, 2011

HWY11MH005

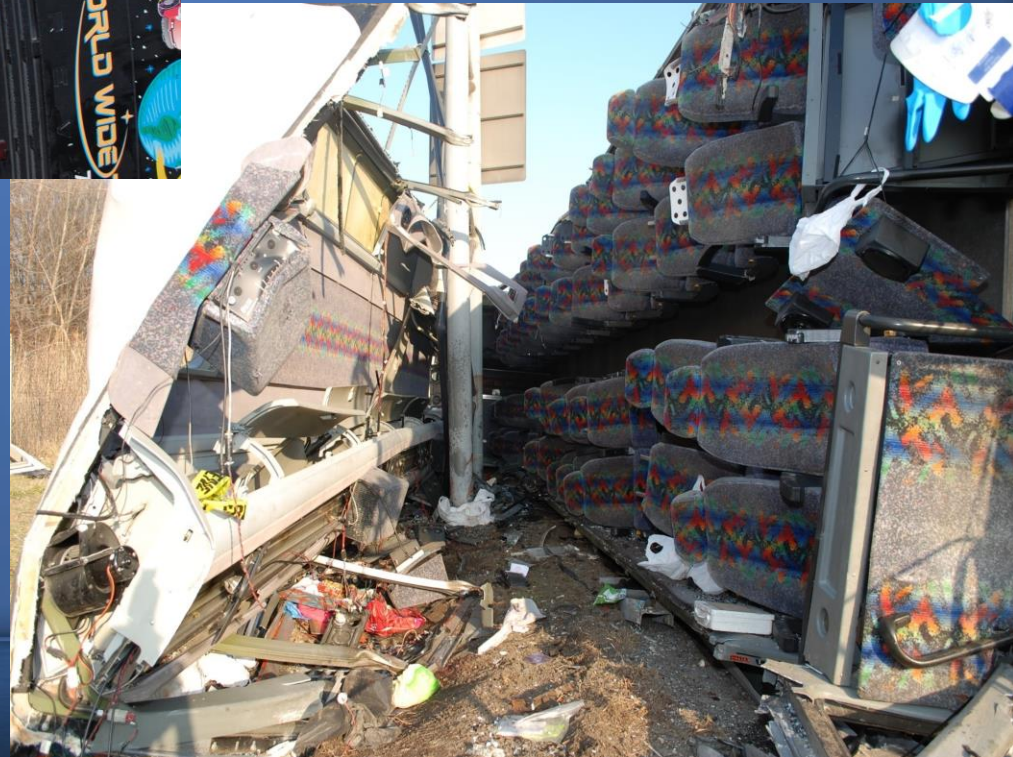


NTSB

'Bronx Bus', New York, NY (March 12, 2011)



15 fatalities
17 injuries



Probable Cause

“The National Transportation Safety Board determines that the probable cause of the accident was the motorcoach driver's failure to control the motorcoach due to fatigue resulting from failure to obtain adequate sleep, poor sleep quality, and the time of day at which the accident occurred.”



Asiana 214 (July 6, 2013)

San Francisco, CA (SFO)



3 fatalities
49 seriously injured



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Probable Cause

Contributing to the accident were . . .

(5) flight crew fatigue, which likely degraded their performance.



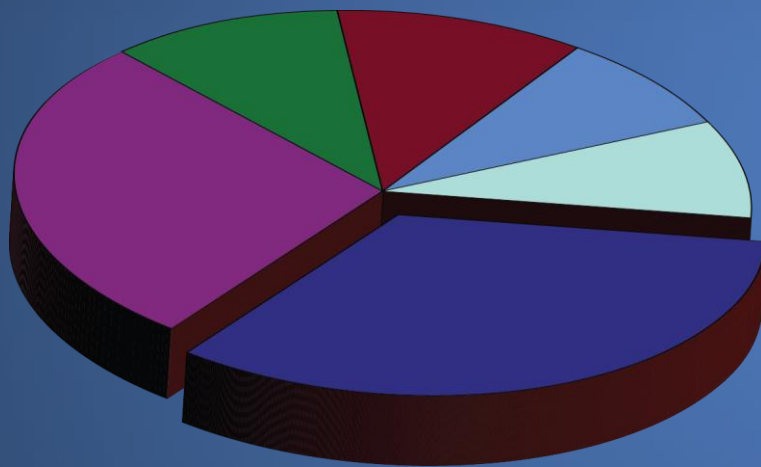
NTSB Recommendations

- MOST WANTED 1990 - 2011
- >200 fatigue recommendations



Complex Issue:

Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



Manage Fatigue = Enhance Safety

- Culture change
- Get educated
- Acknowledge risk
- Take action!



Good sleep, safe travels.



NTSB



National Transportation Safety Board